

# Water Adequacy Physical Availability

in the C & R Aquifers of  
Northern Arizona

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# Outline



Governor Ducey's Water Solutions Conversation

Physical Availability in northern Arizona & why should we care?

ADWR's Water Adequacy Program outside of AMAs

Where we are at today and next steps



# Ducey's Water Solutions



June 2017 Governor kicked off a conversation

Created a Colorado River and Groundwater Work Groups

Goal address water issues & solutions for water resources resiliency for the next generation

Develop a legislative package



# Ducey's Water Solutions



## Groundwater Work Group



Flagstaff 1 of 3 Cities invited to participate

July 2017: Flagstaff proposed amending the Rules to provide an alternative standard for demonstrating physical availability

August 2017: concept approved with no objections to forward onto the Governor's office





# Physical Availability



## Why should we care in northern Arizona?

There is *little to no regulatory limit* to groundwater pumping within the C & R Aquifers of northern Arizona....

otherwise it's the proverbial

*"race to the bottom of the aquifer"*

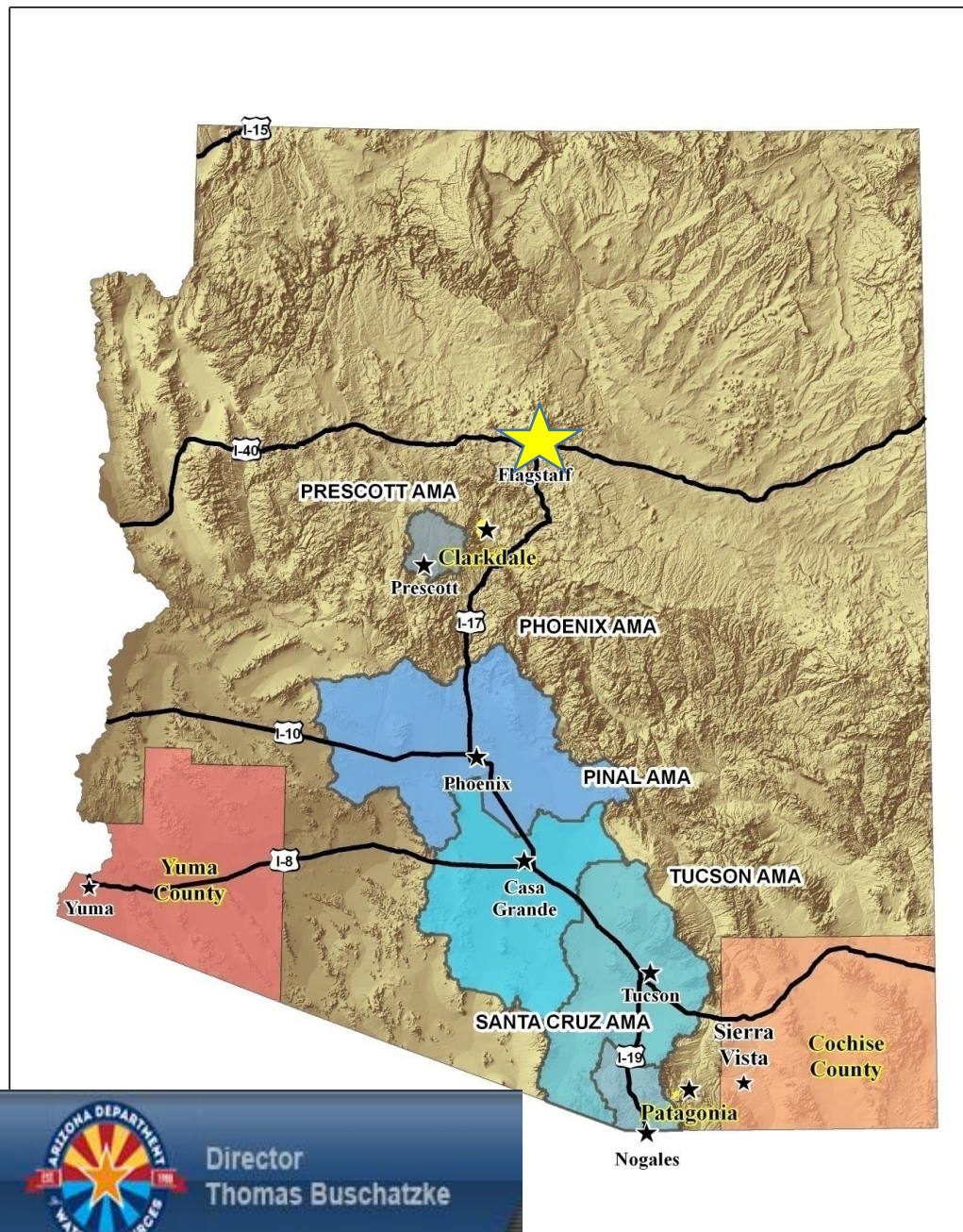
*and*

*"the entity with the most money will get the water"*



# Arizona Department of Water Resources

## Assured & Adequate Water Supply Program



Director  
Thomas Buschatzke

Protecting Arizona's Water Supplies For Its Next Century



# Water Adequacy



## 5 Criteria used by ADWR to demonstrate a Designation of Adequate Water Supply outside an AMA

- 1 Continuous availability (infrastructure)
- 2 Legal availability (water rights & contracts)
- 3 *Physical availability (hydrology study to prove 100-years of groundwater exists <1,200 feet depth below land surface)*
- 4 Financial Capability (\$\$ to drill & construct water system)
- 5 Water Quality (adequate treatment works, etc)

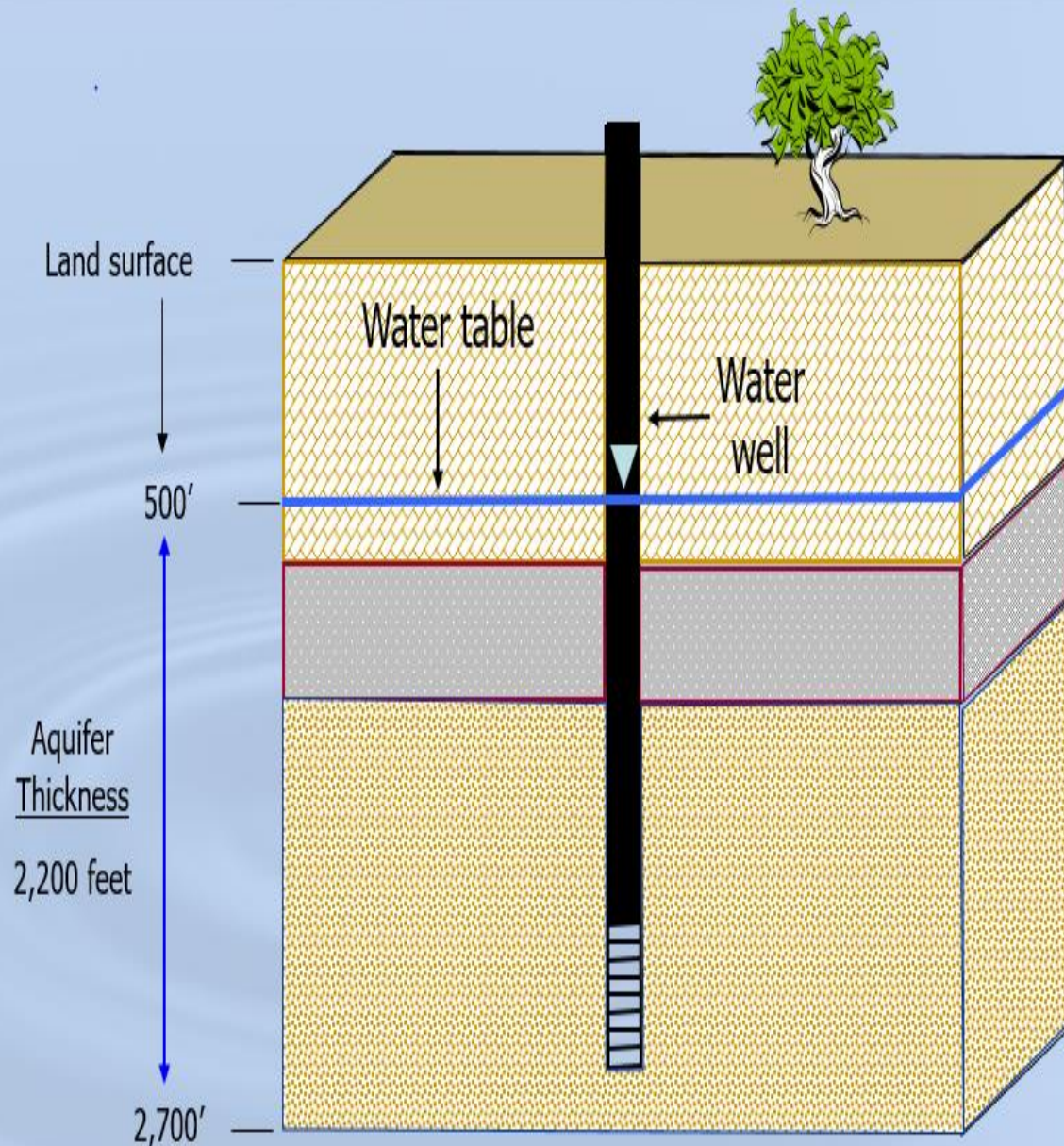


# Physical Availability

## Groundwater Aquifer

Existing hydrologic  
criteria outside of an  
AMA

Depth to Water  
< 1,200 feet below land  
surface



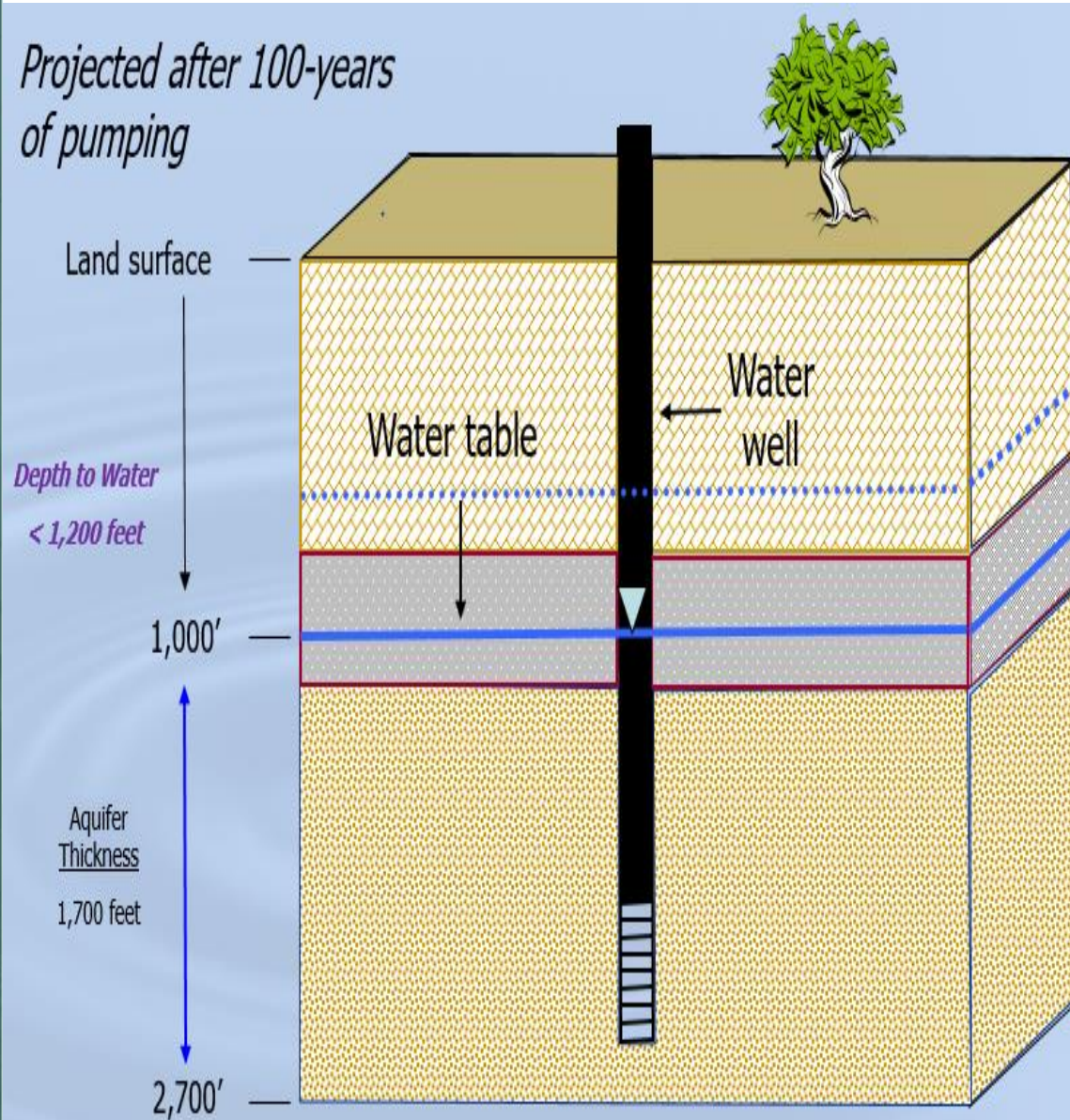


# Physical Availability

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# Water Adequacy



## 2008 – Coconino County considered adopting Mandatory Adequate Water Supply Rules

Committee of Hydrologists & Lawyers proposed an additional criteria to be added Physical Availability (R12-15-716):

*U.S. Geological Survey, Northern Arizona University, Consulting, County & City*

*Proposed: after 100 years of of withdrawals, at least “50%” of the estimated groundwater in storage should be remaining*

City asked the County to wait on adoption, no groundwater modeling

Governor Brewer instituted a “Moratorium” on Rule Making





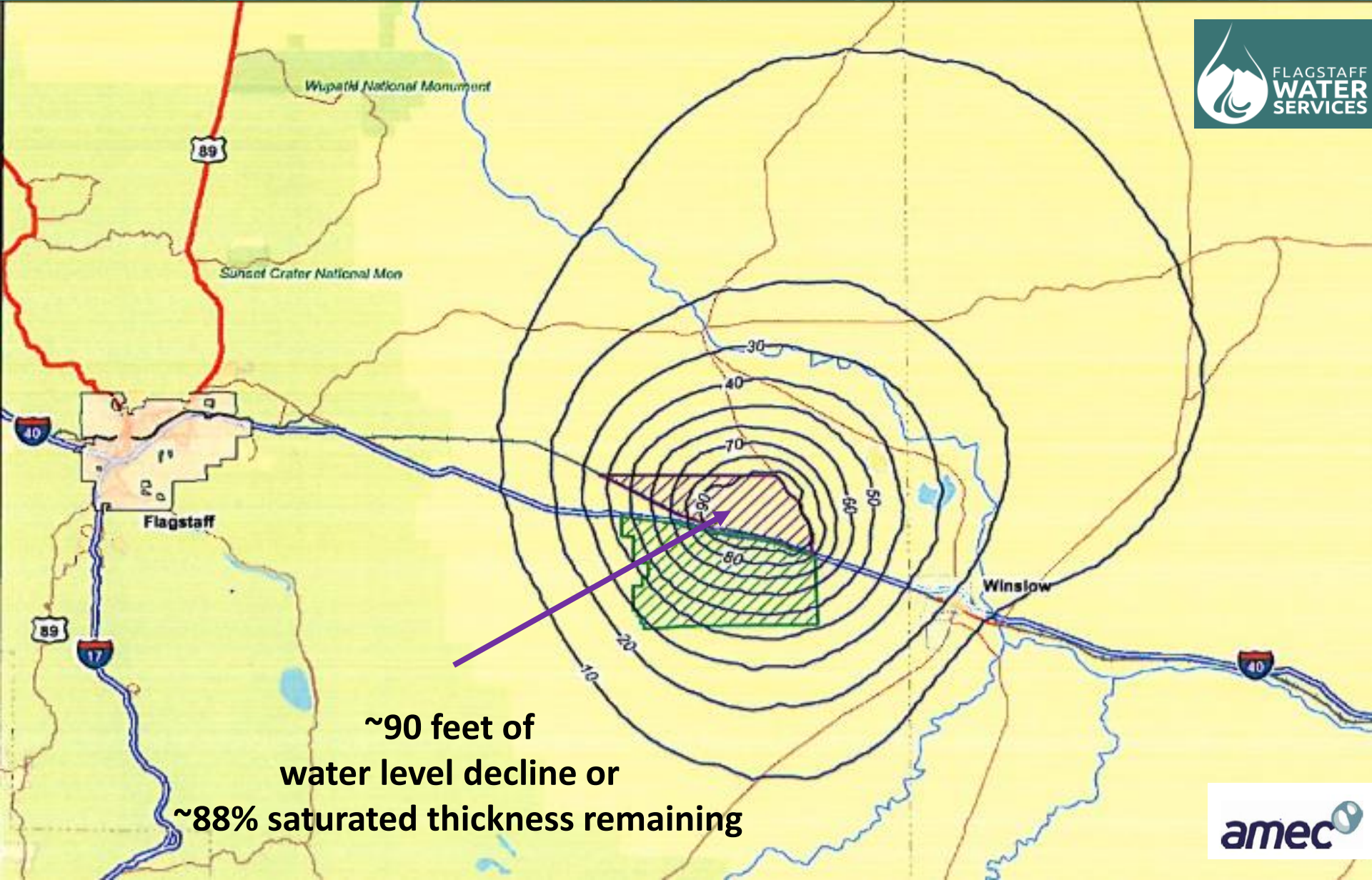
# 2009 – 2015 City of Flagstaff & Coconino Watershed Partnership

## Several groundwater modeling efforts in northern Arizona

1. *U.S. Geological Survey's Northern Arizona Regional Groundwater Flow*
2. *City of Flagstaff funded (2) groundwater flow models to demonstrate Designation of Adequate Water Supply (Red Gap Ranch & Coconino Plateau)*
3. *USBR funded the City of Flagstaff's Red Gap Ranch – Navajo Leupp Water Resource Environmental Assessment groundwater flow model (Navajo Nation, Red Gap Ranch, Cheylon & East Clear Creek and the Coconino Plateau)*



# 2009 Red Gap Ranch Designation of Adequate Water Supply Groundwater Flow Modeling after pumping 100 Years



**~90 feet of  
water level decline or  
~88% saturated thickness remaining**





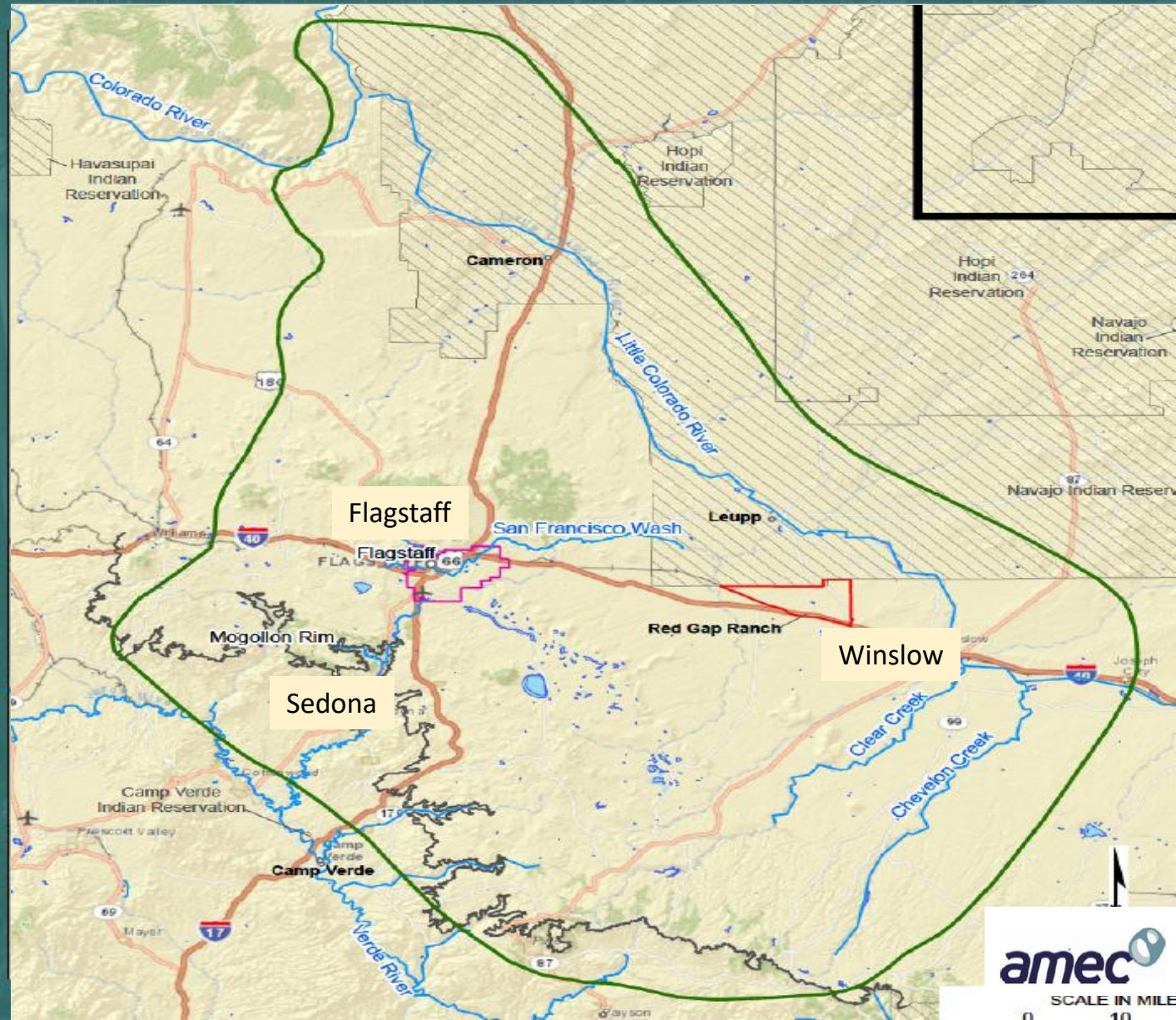


# City of Flagstaff

2012

Designation of Adequate  
Water Supply

Groundwater Flow  
Model  
Boundaries







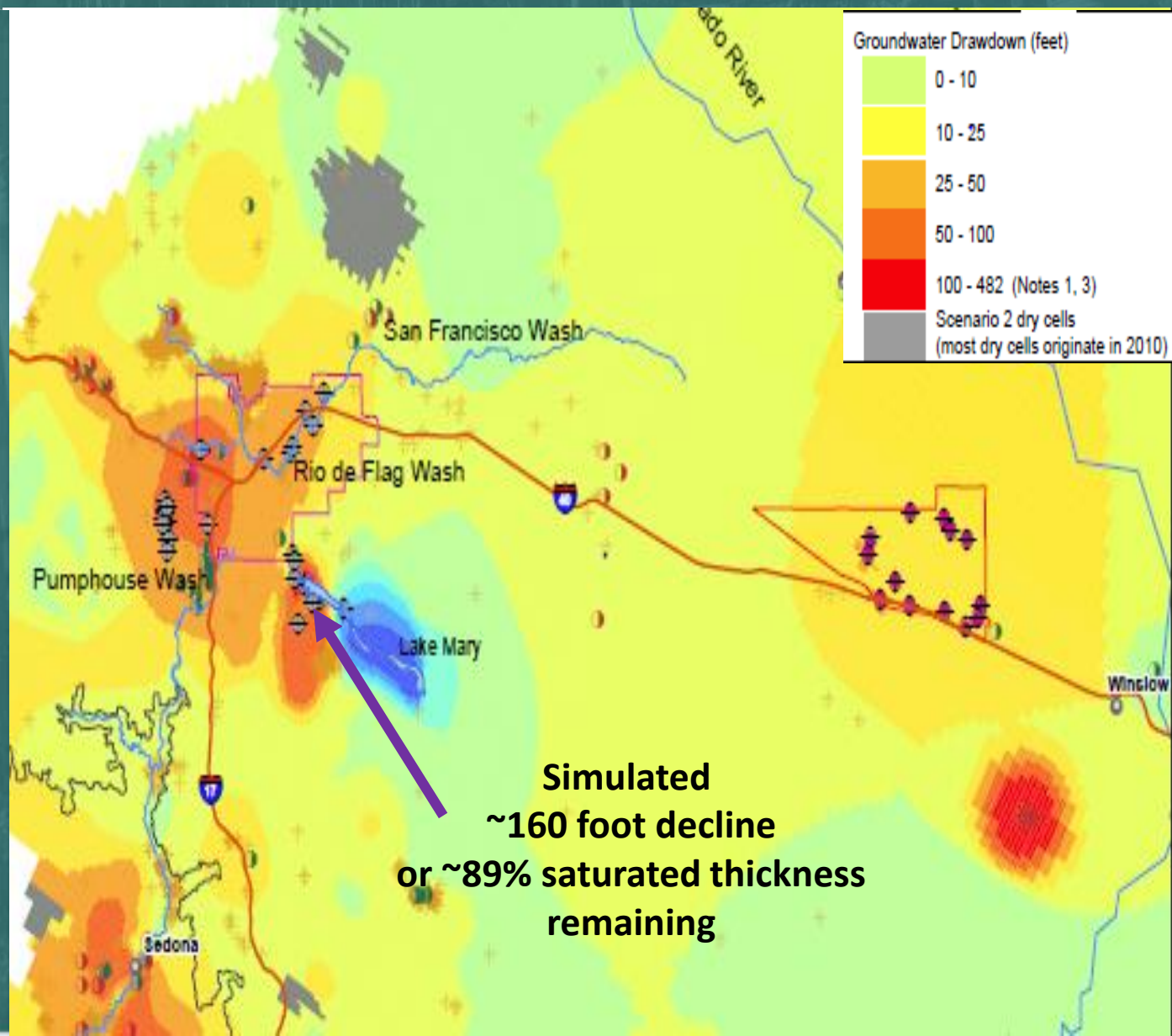
# City of Flagstaff

2012

Designation of Adequate  
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Groundwater Flow  
Model

Coconino Aquifer  
After 100 - Years





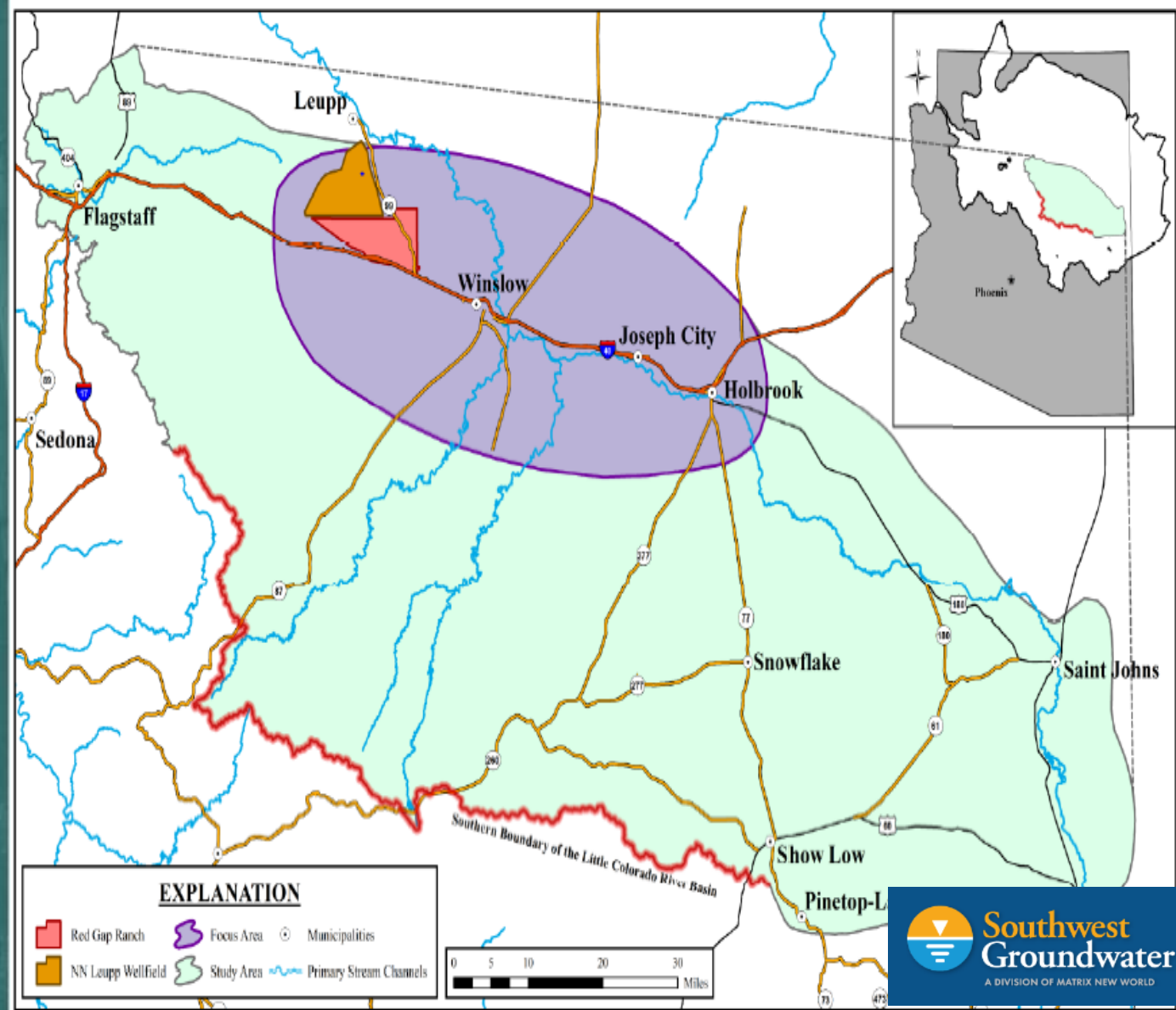


# City of Flagstaff

2015

Red Gap Ranch  
Navajo Leupp

Groundwater Flow  
Model  
Boundaries







# City of Flagstaff

2015

Red Gap Ranch

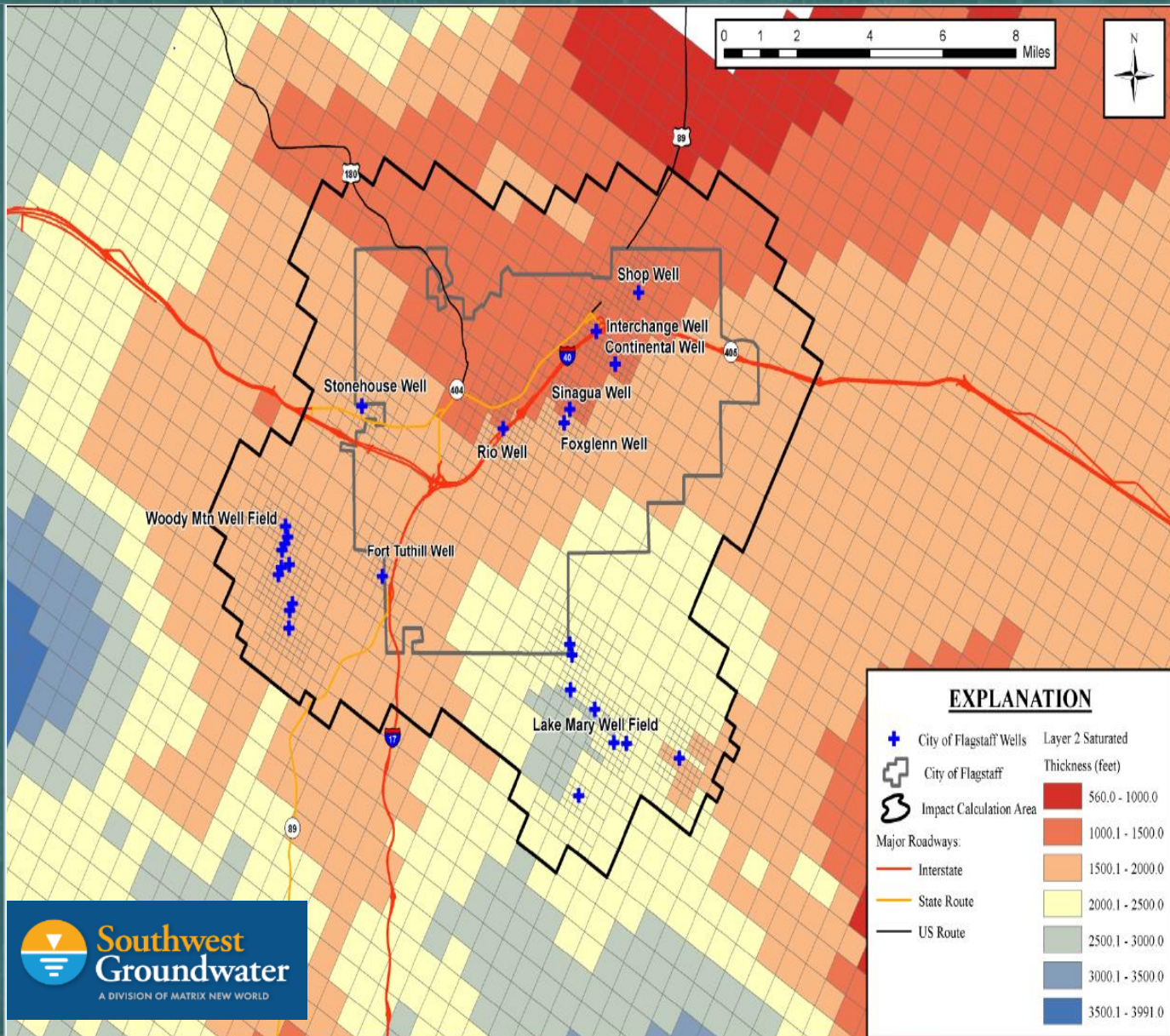
Navajo Leupp

Saturated Thickness

After 100 Years of  
Pumping

9,918 AF/Yr

Base Case



## EXPLANATION

- + City of Flagstaff Wells
- + City of Flagstaff
- Impact Calculation Area
- Major Roadways:
  - Interstate
  - State Route
  - US Route
- Layer 2 Saturated Thickness (feet)
  - 560.0 - 1000.0
  - 1000.1 - 1500.0
  - 1500.1 - 2000.0
  - 2000.1 - 2500.0
  - 2500.1 - 3000.0
  - 3000.1 - 3500.0
  - 3500.1 - 3991.0







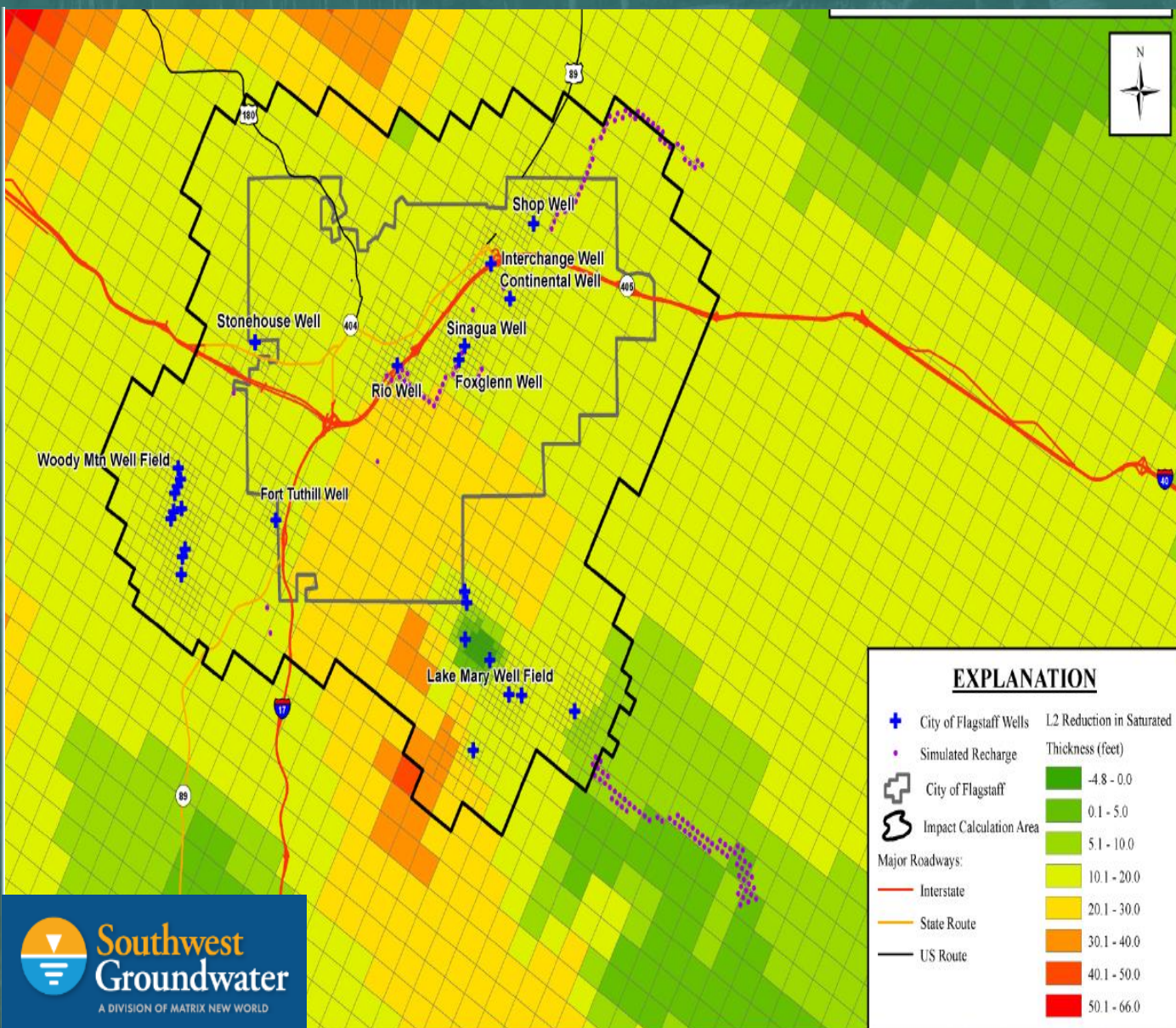
# City of Flagstaff

2015

Red Gap Ranch

Navajo Leupp

Change in  
Saturated Thickness  
after  
100 Years of Pumping  
No Upper Lake Mary





## 2013 – City of Flagstaff became Designated with an Adequate Water Supply using “Financial Capability” (R12-15-720)

With new groundwater modeling information should we propose a more restrictive additional criteria to be added Physical Availability (R12-15-716)?

*Proposed: after 100 years of withdrawals, at least “75%” of the estimated groundwater in storage should be remaining*

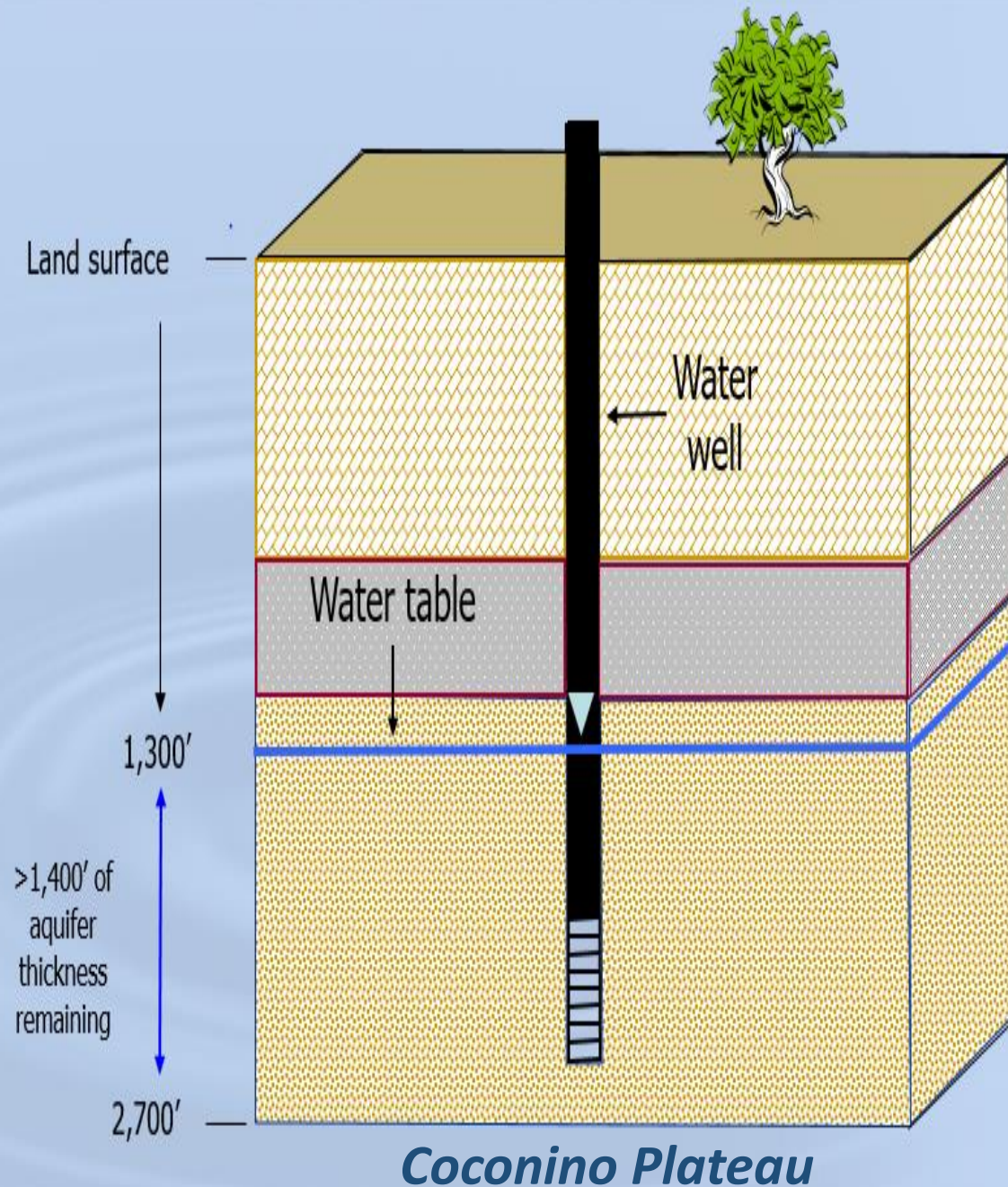


# Physical Availability

## Groundwater Aquifer

Proposed new hydrologic criteria outside of an AMA

> 75% of saturated thickness of aquifer remaining





# Physical Availability

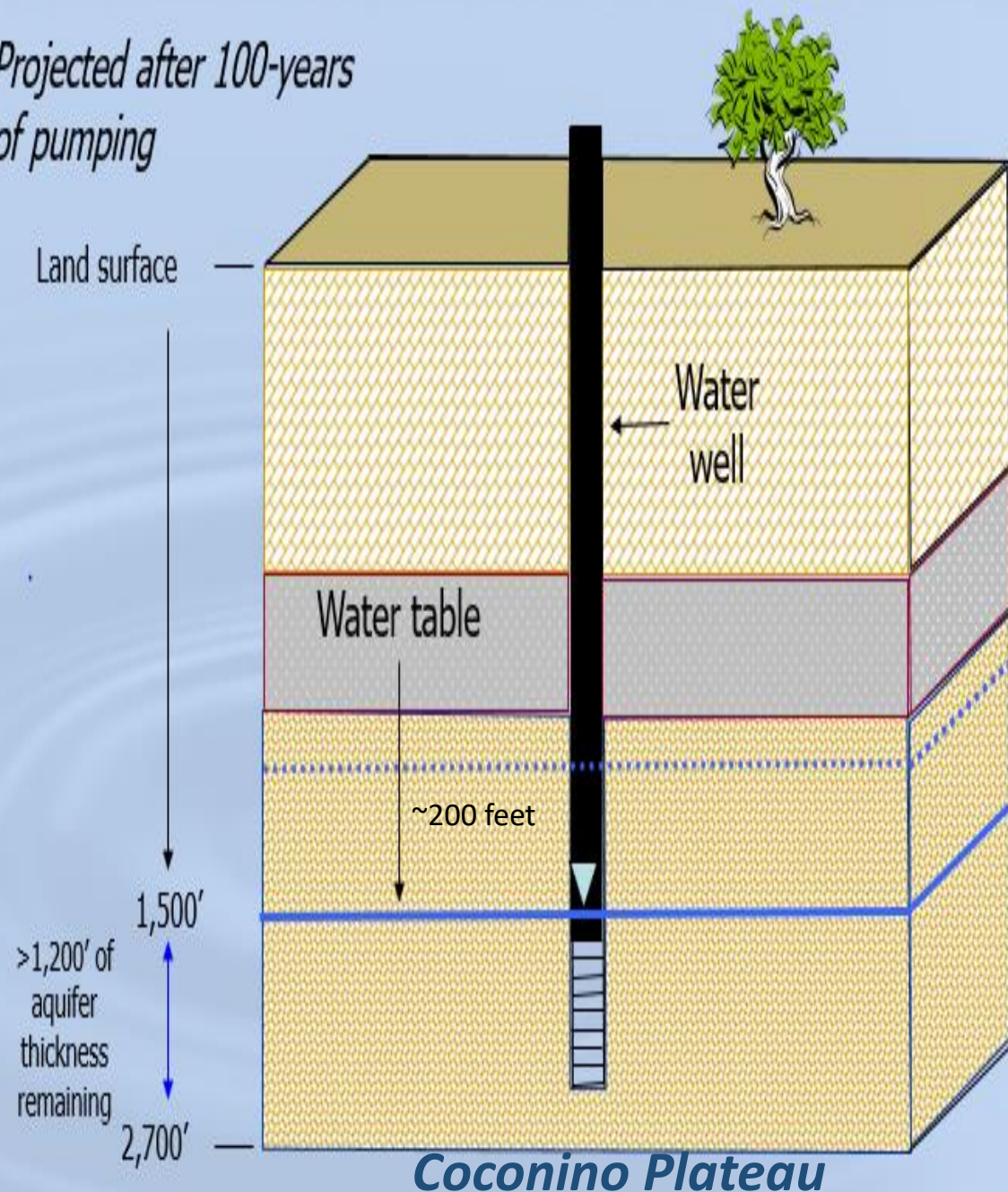
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*Projected after 100-years of pumping*





# Physical Availability

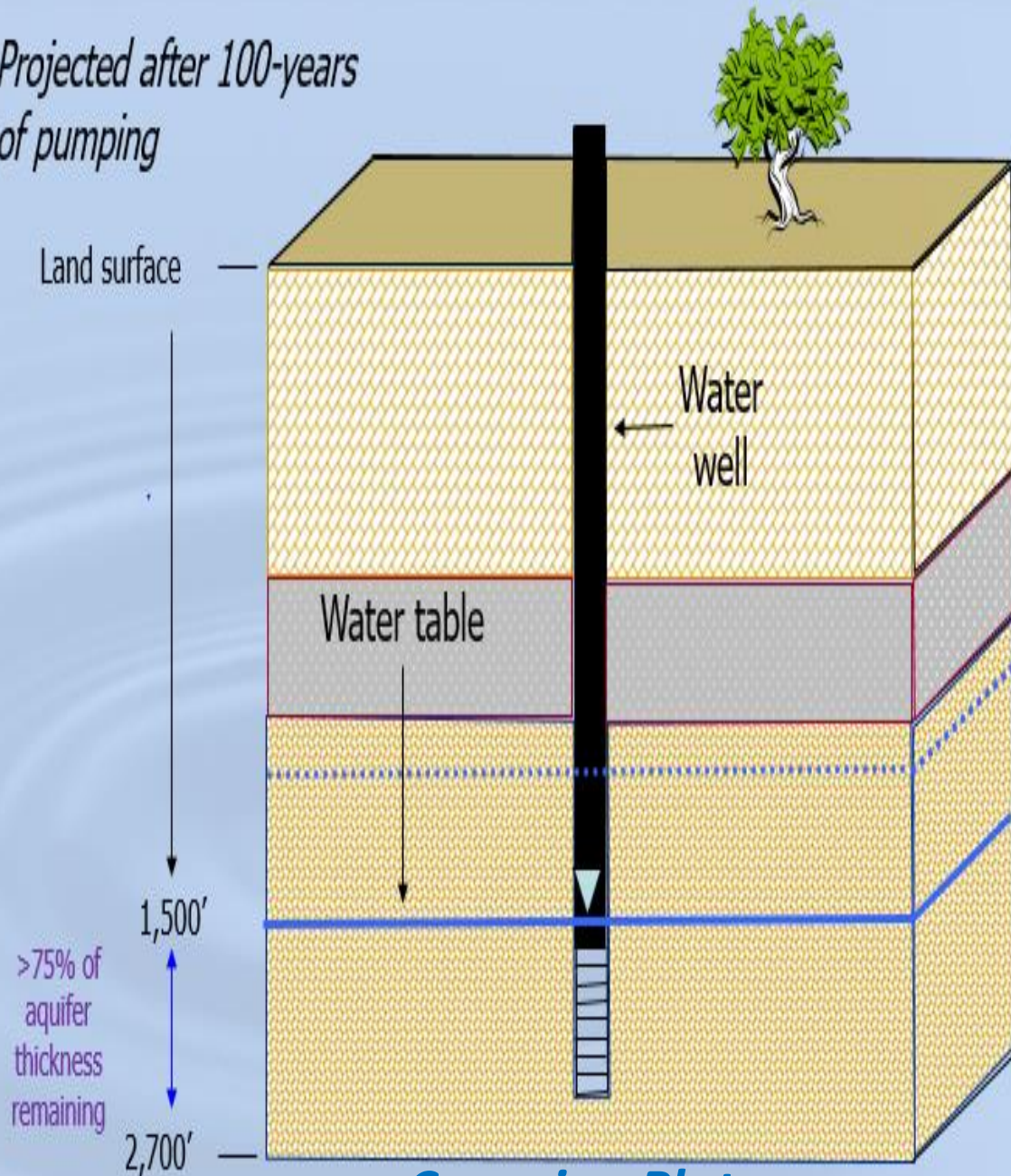
## Groundwater Aquifer

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> 75% of saturated thickness of aquifer remaining



*Projected after 100-years of pumping*



**Coconino Plateau**



# Next Steps



## Arizona Department of Water Resources (ADWR)

- Create a Stakeholder Group to conclude what changes, if any, does northern Arizona want pertaining to Physical Availability?

...e.g., 50% v. 75% v. leave Rule as written?

- ADWR wants to participate but not lead
- Should City of Flagstaff lead discussion?
  - Introduce to City Council in October





# Next Steps



## CHALLENGES

- 50% saturated thickness was consensus in 2008, further restrictions (e.g., 75%) may be difficult
- City asked ADWR if a Rule update could be geographically limiting, such as apply only to the Coconino Plateau portion of the C & R aquifers?

*ADWR stated that the SB 1575 (2007) language required any changes to existing Rule will have to be applied to entire C & R regional aquifers in northern Arizona*

- Little Colorado River Adjudication Litigation
  - *unquantified C-Aquifer Federal Reserved Rights*



# QUESTIONS?

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